

BASIS FOR THE AMENDMENT

The specification has been amended in a manner as kindly suggested by the Examiner so as to overcome his objections thereto.

Claim 1 has been amended by incorporating therein the limitation of Claim 2, Claim 2 thus having been cancelled, as well as page 8, line 10 of the specification.

The other claims have been amended in a manner believed to overcome the Examiner's objections thereto, consistent with the disclosure. No new matter has been introduced thereby.

REMARKS

Favorable reconsideration of this application is requested.

Claims 1, 4, 6-27 and 31-51 remain in the case.

Claims 1-3, 5, 7-13, 22, 41-43 and 50 stand rejected under 35 U.S.C. § 102(e) as being anticipated by Nakayama et al.

Claims 4, 6, 23 and 47 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakayama et al.

Claims 14-21, 35-40 and 44-46 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakayama et al in view of D'Heureuse et al.

Claims 24-34, 48, 49 and 51 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakayama et al in view of Gelbart et al.

Claims 1, 24-26, 28, 29 and 31-34 stand rejected under 35 U.S.C. § 102(a) as being anticipated by Kobayashi et al.

It is submitted that the claims, as amended above, are no longer subject to these rejections, their withdrawal being requested.

The invention relates to a printing plate material comprising a substrate on the surface of which a coat layer containing a titanium oxide photocatalyst and at least one member selected from the group consisting of Fe^{2+} , Ni^{2+} , Mn^{2+} , Cr^{3+} , and Cu^{2+} in the form of a salt or an oxide, or a group VIB or IVA metal or an oxide thereof, is formed directly or with an intermediate layer intervening between the substrate and the coat layer.

Since a coat layer containing a titanium oxide photocatalyst is provided directly on the surface of a substrate of the printing plate material according to the present invention, or with an intermediate layer interposing, conversion of the surface of the plate material from hydrophobic to hydrophilic is possible by irradiating the surface with light (ultraviolet rays) having an energy higher than a band gap energy of the titanium oxide photocatalyst.

Accordingly, utilization of the hydrophobic portion and the hydrophilic portion as a printing image portion and non-printing image portion, respectively, allows this printing plate material to function as an actual printing plate material. In addition, incorporation of a metal other than titanium as defined allows the rate of hydrophilization under irradiation with ultraviolet rays to increase and allows the time for writing an image on the plate to be shortened. By providing an intermediate layer between the substrate and the coat layer in this case, sufficient adhesion between them is ensured.

The mechanism in which the titanium oxide photocatalyst is rendered hydrophilic by irradiation with ultraviolet rays is presumed as follows. When the titanium oxide photocatalyst is hydrophobic, oxygen O^{2-} is bonded in the form of a bridge between Ti^{4+} ions on the surface thereof. Upon irradiation of this with ultraviolet rays, the bridge-like O^{2-} is converted to an O atom, which is eliminated from the surface and the two electrons released from the eliminated O^{2-} reduce two adjacent Ti^{4+} to form (Ti^{3+}) s. Then, water molecules in the air are adsorbed to the oxygen deficient portion to form hydroxyl groups. These hydroxyl

groups further adsorb water molecules from the air and thereby a layer of hydroxyl groups is formed on the surface of the coat layer, resulting in hydrophilicity. Thus, the phenomenon of hydrophilization of the titanium oxide photocatalyst starts from the reduction process of Ti^{4+} under irradiation with ultraviolet rays. Addition of at least one of Fe^{2+} , Ni^{2+} , Mn^{2+} , Cr^{3+} , and Cu^{2+} into a titanium oxide photocatalyst layer in a small amount promotes the reduction process of Ti^{4+} .

This is not the mechanism by which the printing plate of Nakayama et al is prepared and used. Specifically, in order for the printing plate of Nakayama et al to function in its intended manner, the hydrophilic area of the exposed area is made hydrophobic by heat treatment prior to use. Note, column 3, lines 12-13. In contrast thereto, the metallic component used with TiO_2 in the invention is employed to promote the composition of the organic material and to effect converting the surface of the titanium oxide for the catalyst itself to a hydrophilic surface. According to the present invention, heat treatment does not make the surface of the titanium oxide for the catalyst hydrophobic. A different and nonanalogous effect thus manifestly is obtained by the claimed invention.

As disclosed by Nakayama et al at column 2, line 63 to column 3, line 13:

The present invention provides:

(1) A lithographic printing method comprising repetition of the steps of:

exposing a printing plate precursor having on the surface thereof a thin layer comprising TiO_2 , ZnO or at least one compound selected from the group consisting of $RTiO_3$ wherein R represents an alkaline earth metal atom, $AB_{2-x}C_xD_{3-x}E_xO_{10}$ wherein A represents a hydrogen atom or an alkali metal atom: B represents an alkaline earth metal atom or a lead atom: C represents a rare earth atom: D represents a metal atom of the group 5A of the Periodic Table: E represents a metal atom of the group 4A of the Periodic Table; and x represent a number of from 0 to 2, SnO_2 , Bi_2O_3 and Fe_2O_3 to active light to make the exposed area hydrophilic, and

making the hydrophilic area hydrophobic by heat treatment (Emphasis added).

In other words, titanium oxide or any of the other compounds are employed, not in combination with each other. In the claimed invention, on the other hand, titanium oxide alone does not provide for the unobviously superior results obtained by the claimed invention.

In addition, even if a complex compound having a specific composition as claimed in Nakayama et al, that is, $RTiO_3$ or $AB_{2-x}C_xD_{3-x}E_xO_{10}$, is used as a dopant with TiO_2 or ZnO , such a material differs from the material of the present invention. In the present invention, the metallic component coexisting with TiO_2 is simply in the form of a specific metal atom, metal ion, or metal oxide (MeO_x), as claimed.

For example, according to Nakayama et al, B in $AB_{2-x}C_xD_{3-x}E_xO_{10}$ may be lead. In this case, $AB_{2-x}C_xD_{3-x}E_xO_{10}$ is limited to a complex compound. On the other hand, although lead may be used with TiO_2 according to the present invention, the lead is present not in the form of a complex compound, but in the form of a metal atom or metal oxide (MeO_x) with the titanium oxide photocatalyst. The lead added which is in a form other than a metal atom or metal oxide (MeO_x) does not result in a desirable effect according to the present invention.

Furthermore, alkali metals (Li, Na, K, Rb, Cs, and Fr) and alkali earth metals (Be, Mg, Ca, Sr, Ba, and Ra), which are disclosed in Nakayama et al, are known to reduce the photocatalytic activity of TiO_2 . Therefore, the present invention does not use any alkali metal or alkali earth metal.

In addition, Nakayama et al discloses group VB (V, Nb, and Ta) and group IVB (Ti, Zr, and Hf) of the periodic table and rare earth metals (Sc, Y, La, Ce, Pr, Nd, Pm, Sm, Eu, Gd, Tb, Dy, Ho, Er, Tm, Yb, and Lu), these elements not being included in the printing plate material of the present invention. Also, Nakayama et al also discloses Fe_2O_3 (wherein iron is

in the form of Fe³⁺). Although Fe²⁺ may be used in the present invention in the form of an ion or oxide, the valence thereof is 2+, different from 3+ of Nakayama et al.

In the Examiner's rejection of the claims under 35 U.S.C. § 103, he states that:

However, in view of the many types of metals and metal oxides disclosed in Nakayama et al it would have been obvious to one of ordinary skill in the art through routine experimentation to use either a compound metal oxide or any of the other recited metals to achieve similar benefits.

This rationale appears to be based on an "obvious to try" approach. However, such cannot be the basis for rejection under this Section of the Statute, as note In re Goodwin et al, 198 USPQ 1. Here, an unobviously superior results contrary to the procedure of Nakayama et al is involved, which manifestly cannot be said to be obvious.

The secondary references D'Heureuse et al and Gelbart et al manifestly do not cure the basic deficiencies of Nakayama et al. They are relied upon only for asserted obviousness of subsidiary claim features. As such, they manifestly do not remedy the inadequacies of Nakayama et al, for reasons as pointed out above.

With regard to the rejection of the claims over Kobayashi et al, Claim 2, correctly, was not included in this rejection. In view of the fact that the limitation of Claim 2 has now been incorporated into Claim 1, all of the claims ultimately depending thereon, this rejection clearly has been overcome.

Withdrawal of the rejections of the claims under 35 U.S.C. § 102 and § 103 thus is requested.

Should any further amendment to the specification and the claims be considered necessary by the Examiner, he is requested to telephonically contact the undersigned so that mutually agreeable language may be arrived at.

It is submitted that this application is now in condition for allowance and which is solicited.

Respectfully submitted,

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IN THE SPECIFICATION

Please amend at the places indicated.

Page 8, beginning at line 11, please amend the paragraph to read as follows:

A fifth aspect of the present invention is a printing plate material as in the first aspect, in which the metal other than titanium is a group [VIa or IVb] VIB or IVA metal or an oxide thereof.

Page 8, beginning at line 25, please amend the paragraph to read as follows:

In the step of forming a latent image on the surface of the plate material by irradiating it with light having an energy level higher than a band gap energy level of the titanium oxide (this step is hereinafter referred to as "image writing step"), the incorporation of a group [VIa or IVb] VIB or IVA metal or an oxide thereof in the surface of the coat layer containing the titanium oxide photocatalyst or in the photocatalyst phase allows reduction of the energy required to convert the hydrophobic surface to the hydrophilic surface (this energy is hereinafter referred to as "plate material sensitivity").

Page 9, beginning at line 9, please amend the paragraph to read as follows:

A sixth aspect of the present invention is a printing plate material as in the fifth aspect, in which the group [VIa] VIB metal is any of W, Mo, and Cr.

Page 9, beginning at line 12, please amend the paragraph to read as follows:

A seventh aspect of the present invention is a printing plate material as in the fifth aspect, in which the group [IVb] IVA metal is any of Ge, Sn, and Pb.

Page 10, beginning at line 18, please amend the paragraph to read as follows:

A [seventh] tenth aspect of the present invention is a printing plate material as in any of the first to seventh aspects, in which the surface of the coat layer has hydrophobicity in terms of a water contact angle of at least 50° in its initial state and is converted to a hydrophilic surface having a water contact angle of 10° or less by irradiation with light having a wavelength at an energy level higher than a band gap energy level of the titanium oxide photocatalyst.

Page 16, beginning at line 17, please amend the paragraph to read as follows:

With this construction, the surface of the coat layer which contains a portion which is [hydrophobic] hydrophilic is made hydrophobic by light irradiation thereon and an electrochemical treatment thereon in combination. Then, the printing plate material can be considered to have become one equivalent to the printing plate material of the seventeenth aspect, i.e., the printing plate material is in an initial state again. This means that the printing plate materials can be recycled.

Page 19, beginning at line 23, please amend the paragraph to read as follows:

A twenty-eighth aspect of the present invention is a printing plate material as in the twenty-fourth aspect, in which the metal other than titanium is a group [VIa or IVb] VIB or IVA metal or an oxide thereof.

Page 19, beginning at the last line, please amend the paragraph to read as follows:

A twenty-ninth aspect of the present invention is a printing plate material as in the twenty-eighth aspect, in which the group [VIa] VIB metal is any of W, Mo, and Cr.

Page 20, beginning at line 3, please amend the paragraph to read as follows:

A thirtieth aspect of the present invention is a printing plate metal as in the twenty-eighth aspect, in which the group [VIa] VIB metal is any of Ge, Sn, and Pb.

Page 25, beginning at line 13, please amend the paragraph to read as follows:

[forty-third] Forty-third aspect of the present invention is a method for renewing a printing plate material as in the printing plate material of the first aspect, the method comprising the steps of:

Page 33, beginning at line 20, please amend the paragraph to read as follows:

The expression "an initial state of the printing plate material as prepared" can be interpreted as meaning the time of initiation in an actual printing process. More specifically, it indicates a state where, for any given image, digitized data thereof are already provided and an image from the data is being written onto the printing plate material. However, the stage at [whichthe] which the digitized data are provided may be after the hydrophobization treatment in respect of the surface of the coat layer 3 as described later on and the statement just above should not be construed in a strict sense. That is, when the "initial state of the printing plate material as prepared" is defined as the "time of initiation in an actual printing process," such should be interpreted in a broad sense.

Page 36, beginning at line 6, please amend the paragraph to read as follows:

When the treatment thus far is over, a hydrophobic printing ink is coated onto the surface of the coat layer 3. Then, for example, a printing plate material as shown in Fig. 4 is prepared. In Fig. 4, the hatched portion is a portion where the above hydrophilization treatment has not been performed, that is the hydrophobic portion, and hence indicates a printing image portion 4 where a printing ink is adhered. The remaining background portion 5, that is, the hydrophilic portion, repels the printing ink and hence indicates a non-printing image portion where no adhesion of the printing ink has occurred. Emergence of a picture pattern in this manner allows the surface of the coat layer 3 to function as a master plate.

Page 43, beginning at line 8, please amend the paragraph to read as follows:

The process for renewing the printing plate after completion of the printing as described above was performed as follows. First the plate cleaning apparatus 14 was brought into contact with the plate cylinder 11 and the ink and dampening water adhered to the surface of the printing plate were wiped off. Thereafter, the plate cleaning apparatus 14 was released from the plate cylinder 11 and the coating apparatus 12 was brought into contact with the plate cylinder 11. By so doing, the coat layer 3 was being renewed on the printing plate material. Thereafter, the coating apparatus 12 was released from the plate cylinder 11, followed by operating the drying apparatus 17 to evaporate the solvents, etc., contained in the coat layer 3. Then, an image was written on the renewed surface of the coat layer 3 with ultraviolet rays emitted by the writing apparatus 15 based on digital data of the image provided in advance. After completion of the above steps, the inking roller 16 and the blanket cylinder 13 were brought into contact with the plate cylinder 11. Then paper 18 was fed so as to make contact with the blanket cylinder 13 and to be carried in the direction of the arrow as shown in Fig. [7] 11 so that continuous printing could be performed.

Page 49, beginning at line 17, please amend the paragraph to read as follows:

The irradiation with ultraviolet rays decomposes the compound constituting the coating layer 24 as also shown in 23 Fig. 8, causing the surface of the coat layer [3] 23 to emerge and converting the surface to have hydrophilicity. This is attributable to the effect of the titanium oxide photocatalyst. Since the decomposition of the compound proceeds by the inherent catalytic effect of the titanium oxide photocatalyst, it is completed very quickly. This puts the region of the surface of the coat layer [3] 23 irradiated with ultraviolet rays in a state of having a water contact angle of 10° or less. This state is exactly opposite the state of the hydrophobic surface in the coating layer 24 described earlier. That is, water spreads on

the surface of the coat layer 23 almost in the form of a film whereas it is impossible for a printing ink to adhere on the surface thereof.

Page 50, beginning at line 13, please amend the paragraph to read as follows:

When the treatment thus far is over, a hydrophobic printing ink is coated onto the surface of the coating layer 24 or the hydrophilization treated coat layer 23. Then, for example, a printing plate material as shown in Fig. 9 is prepared. In Fig. 9, the hatched portion is a portion where the above hydrophilization treatment has not been performed, that is the hydrophobic portion or a portion where the coating layer 24 remains and hence indicates a printing image portion where printing ink is adhered. The remaining non-imaged portion, that is, the hydrophilic portion 25 or the portion where the surface of the coat layer 23 emerges, repels the printing ink and hence indicates a non-printing image portion where no adhesion of the printing ink has occurred. Emergence of a picture pattern in this manner allows the [the] printing plate material to function as a master plate.

Page 59, beginning at line 3, please amend the paragraph to read as follows:

In the present embodiment, the intermediate layer 22 was provided between the substrate 21 and the coat layer 23. However, the present invention is not limited thereto. That is, the intermediate layer [23] 22 does not have to be provided. This is because the major essential features of the present invention are not harmed by the absence of the intermediate layer [23] 22 as will be apparent from the explanation thus far made.

Page 60, beginning at line 22, please amend the paragraph to read as follows:

The group [VIa and IVb] VIB and IVA metals or metal oxides may be contained in the surface of the titanium oxide photocatalyst or in the photocatalyst phase. However, it is preferable that they be contained in the surface of the titanium photocatalyst. For example, in the case where the group [VIa or IVb] VIB or IVA metal is contained in the surface of the

titanium oxide photocatalyst, the group [VIa or IVb] VIB or IVA metal can be incorporated into the surface of the titanium oxide photocatalyst by impregnating the surface of the titanium oxide photocatalyst with a solution containing the group [VIa or IVb] VIB or IVA metal, and thereafter heat-treating the titanium oxide photocatalyst.

Page 61, beginning at line 6, please amend the paragraph to read as follows:

An example of a solution containing a group [VIa] VIB metal is an aqueous ammonia solution of tungstic acid, molybdic acid, or chromic acid. Examples of solutions containing group [IVb] IVA metal are an aqueous solution of tin nitrate ($\text{Sn}(\text{NO}_3)_4$), an acetone solution of germanium acetate ($\text{Ge}(\text{CH}_3\text{COO})_4$), and an aqueous ammonia solution of lead nitrate ($\text{Pb}(\text{NO}_3)_2$) However, the solution containing group [VIa or IVb] VIB or IVA metal is not limited to these examples.

Page 61, beginning at line 14, please amend the paragraph to read as follows:

The amount of the group [VIa or IVb] VIB or IVA metal or its metal oxide added is 0.5 to 50% by weight, preferably 1 to 30% by weight, with respect to the amount of the titanium oxide photocatalyst. If this amount is less than 1%, it is difficult to bring out the effect of the addition the group [VIa or IVb] VIB or IVA metal or its metal oxide. If the amount exceeds 500, the photocatalytic action inherent to titanium oxide is weakened.

Page 62, beginning at line 25, please amend the paragraph to read as follows:

In addition, since a group [VIa or IVb] VIB or IVA metal or its oxide n is added to the titanium oxide photocatalyst in order to increase the sensitivity of the plate material, the function of the titanium oxide photocatalyst to decompose organic substances is lower than that in the case of a photocatalyst with 100% titanium oxide. Accordingly, a compound which can sufficiently hydrophobize the hydrophilic portion in the surface of the plate

material with a small amount and which can be easily decomposed and removed by the action of the [the] titanium oxide photocatalyst is particularly preferable.

Page 71, beginning at line 3, please amend the paragraph to read as follows:

In order to perform the above-described printing and renewal of the plate in a printing machine, a printing machine 30 (printing apparatus) as shown in Fig. 13 is preferably used. Specifically, the printing machine 30 comprises a plate cleaning apparatus 32 (cleaning apparatus), a hydrophobization treatment apparatus 33 (renewal apparatus), a writing apparatus 34, a drying apparatus 35, an inking roller 36, a dampening water supplying apparatus [38] 37, and a blanket cylinder 38 around a plate cylinder 31 in the center. The printing plate material is arranged wound around the plate cylinder 11.

Page 87, beginning at line 25 to page 88, line 5, please amend the paragraph to read as follows:

The printing was performed using a printing machine 50 as shown in Fig. 16. Specifically, the printing machine 50 comprises a plate cleaning apparatus 52 (cleaning apparatus), an electrochemical treating apparatus 53 (renewal apparatus), a writing apparatus 55, an inking roller 56, and a blanket cylinder 58 around a plate cylinder [11] 51 in the center. The printing plate material is arranged wound around the plate cylinder 51.

IN THE CLAIMS

--1. (Amended) A printing plate material comprising a substrate on the surface of which a coat layer containing a titanium oxide photocatalyst and [a metal other than titanium] at least one member selected from the group consisting of Fe²⁺, Ni²⁺, Mn²⁺, Cr³⁺, and Cu²⁺ in the form of a salt or an oxide, or a group VIB or IVA metal or an oxide thereof, is formed directly or with an intermediate layer intervening between the substrate and the coat layer.

2-3. (Cancelled).

4. (Amended) The printing plate material as claimed in claim [3] 1, wherein the [oxide] member selected from the group consisting of Fe^{2+} , Ni^{2+} , Mn^{2+} , Cr^{3+} , and Cu^{2+} in the form of a salt or an oxide is a compound oxide with titanium.

5. (Cancelled).

6. (Amended) The printing plate material as claimed in claim [5] 1, wherein said group [VIIa] VIB metal is any of W, Mo. and Cr.

7. (Amended) The printing plate material as claimed in claim [5] 1, wherein said group [IVb] IVA metal is any of Ge, Sn, and Pb.

9. (Amended) The printing plate material as claimed in [any of claims 1 to 7] claim 1, wherein the surface of said coat layer is converted to a hydrophilic surface having a water contact angle of 10° or less by irradiation with light having a wavelength at an energy level higher than a band gap energy level of the titanium oxide photocatalyst.

10. (Amended) The printing plate material as claimed in [any of claims 1 to 7] claim 1, wherein the surface of said coat layer has hydrophobicity in terms of a water contact angle of at least 50° in its initial state and is [converted] convertible to a hydrophilic surface having a water contact angle of 10° or less by irradiation with light having a wavelength at an energy level higher than a band gap energy level of the titanium oxide photocatalyst.

13. (Amended) The printing plate material as claimed in [any of claims 1 to 12] claim 1, wherein at least a portion of the surface of said coat layer [being] is convertible to a hydrophilic [in at least a portion thereof] surface, and the hydrophilic surface is [reconverted] reconverible to a hydrophobic surface having a water contact angle of at least 50° by irradiation with a flux of energy thereon.

14. (Amended) The printing plate material as claimed in [any of claims 1 to 12] claim 1, wherein at least a portion of the surface of the coat layer [being] is convertible to a hydrophilic [in at least a portion thereof] surface, and the hydrophilic surface is [reconverted] reconvertible to a hydrophobic surface having a water contact angle of at least 50° by a chemical conversion treatment thereon.

15. (Amended) The printing plate material as claimed in [any of claims 1 to 12] claim 1, wherein at least a portion of the surface of the coat layer [being] is convertible to a hydrophilic [in at least a portion thereof] surface, and the hydrophilic surface is [reconverted] reconvertible to a hydrophobic surface having a water contact angle of at least 50° by irradiation with a flux of energy thereon and by a chemical conversion treatment thereon.

16. (Amended) The printing plate material as claimed in claim 1, wherein said coat layer has a surface at least a part of which forms a part [converted] reconvertible to a hydrophilic surface by irradiation with light having a wavelength at an energy level higher than a band gap energy of the titanium oxide catalyst and a hydrophobic part which is not irradiated with the light,

where the surface of the coat layer when subjected to light irradiation thereon and an electrochemical treatment thereon is hydrophobic.

18. (Amended) The printing plate material as claimed in claim 16, wherein the surface of said coat layer is [converted] convertible to a hydrophilic surface having a water contact angle of 10° or less by irradiation with light having a wavelength at an energy level higher than a band gap energy level of the titanium oxide photocatalyst.

19. (Amended) The printing plate material as claimed in claim 16, wherein the surface of said coat layer has hydrophobicity in terms of a water contact angle of at least 50° in its initial state and is [converted] convertible to a hydrophilic surface having a water

contact angle of 10° or less by irradiation with light having a wavelength at an energy level higher than a band gap energy level of the titanium oxide photocatalyst.

21. (Amended) The printing plate material as claimed in [any of claims 16 to 20] claim 1, wherein at least a portion of the surface of said coat layer [being] is hydrophilic [in at least a portion thereof] surface, and the hydrophilic surface is [reconverted] reconvertible to a hydrophobic surface having a water contact angle of at least 50° by light irradiation thereon and an electrochemical treatment thereon.

22. (Amended) The printing plate material as claimed in [any of claims 1 to 21] claim 1, wherein the surface of said coat layer [being] is hydrophilic [in at least a portion thereof] surface, and the hydrophilic surface is [reconverted] reconvertible to a hydrophobic surface having a water contact angle of at least 50° by cleaning the surface and renewing the surface of the coat layer containing the titanium oxide catalyst to renew the catalyst.

24. (Amended) The printing plate material as claimed in claim [18] 1, which further comprises on said coat layer a coating layer comprising a compound which can be decomposed by irradiation with light having a wavelength at an energy level higher than a band gap energy level of the titanium oxide photocatalyst.

27. (Amended) The printing plate material as claimed in claim [27] 26, wherein the oxide is a compound oxide with titanium.

28-30. (Cancelled).

31. (Amended) The printing plate material as claimed in [any of claims 24 to 30] claim 24, wherein the surface of said coat layer has hydrophobicity in terms of a water contact angle of at least 50° in its initial state.

32. (Amended) The printing plate material as claimed in [any of claims 24 to 30] claim 24, wherein the surface of said coat layer is [exposed] exposable and is [converted]

convertible to a hydrophilic surface having a water contact angle of 10° or less by irradiation with the light.

33. (Amended) The printing plate material as claimed in [any of claims 24 to 30] claim 24, wherein the surface of said coat layer has hydrophobicity in terms of a water contact angle of at least 50° in its initial state and is [converted] convertible to a hydrophilic surface having a water contact angle of 10° or less by irradiation with the light.

34. (Amended) The printing plate material as claimed in claim 33, wherein the hydrophilic surface serves as a non-printing image portion and [the remaining] a hydrophobic surface of the coating layer serves as a printing image portion.

35. (Amended) The printing plate material as claimed in [any of claims 1 to 12] claim 1, wherein at least a portion of the surface of said coat layer [being] is convertible to a hydrophilic [in at least a portion thereof] surface, and the hydrophilic surface is [reconverted] reconvertible to a hydrophobic surface having a water contact angle of at least 50° by a chemical reaction or strong non-chemical interaction with a compound having an organic hydrophobic group in its molecule.

37. (Amended) The printing plate material as claimed in claim 35[or 36], wherein said compound having an organic hydrophobic group in its molecule is a fatty acid dextrin.

38. (Amended) The printing plate material as claimed in claim 35[or 36], wherein said compound having an organic hydrophobic group in its molecule is an organic titanium compound.

39. (Amended) The printing plate material as claimed in claim 35[or 36], wherein said compound having an organic hydrophobic group in its molecule is an organic silane compound.

40. (Amended) The printing plate material as claimed in [any of claims 1 to 12] claim 1, which can be repeatedly used by repeating the steps of:

preparing a printing plate in which a latent image, which comprises a hydrophobic portion which is not irradiated with light and a portion which is irradiated with light to be changed to a hydrophilic surface, is formed by irradiating the printing plate material with light having an energy higher than a band gap energy of the titanium oxide photocatalyst, and renewing the printing plate material by allowing at least the hydrophilic portion on the surface of the plate material to chemically react or strongly non-chemically interact with a compound having an organic hydrophobic group in its molecule after removing an ink from the surface of the printing plate material after completion of printing.

41. (Amended) [The] An apparatus for imaging the printing plate material as claimed in [any of claims 1 to 40] claim 1, on which an image can be written using a writing apparatus which comprises a light source for emitting light having an energy higher than a band gap energy of the titanium oxide photocatalyst, and which directly forms an image on the plate material based on digital data.

42. (Amended) A method for renewing a printing plate material as claimed in claim 1[or 16], the method comprising the steps of:

cleaning a surface of [a] the coat layer containing [a] the titanium oxide photocatalyst after completion of printing; and
then renewing the coat layer containing a titanium oxide photocatalyst.

43. (Amended) A method for renewing a printing plate material as in the printing plate material of claim 1, the method comprising the steps of:

cleaning a surface of [a] the coat layer containing [a] the titanium oxide photocatalyst after completion of printing; and

then renewing the coat layer containing a titanium oxide photocatalyst by irradiation with a flux of energy thereon.

44. (Amended) A method for renewing a printing plate material as in the printing plate material of claim 1, the method comprising the steps of:

cleaning a surface of [a] the coat layer containing [a] the titanium oxide photocatalyst after completion of printing; and

then renewing the coat layer containing a titanium oxide photocatalyst by a chemical conversion treatment thereon.

45. A method for renewing a printing plate material as in the printing plate material of claim 1, the method comprising the steps of:

cleaning a surface of [a] the coat layer containing [a] the titanium oxide photocatalyst after completion of printing; and

then renewing the coat layer containing a titanium oxide photocatalyst by irradiation with a flux of energy thereon and a chemical conversion treatment thereon in combination.

46. (Amended) A method for renewing a printing plate material as in the printing plate material of claim 16, the method comprising at least the steps of:

cleaning a surface of [a] the coat layer containing [a] the titanium oxide photocatalyst after completion of printing; and

then renewing the coat layer containing a titanium oxide photocatalyst by light irradiation thereon and an electrochemical treatment thereon.

47. (Amended) The method for renewing a printing plate material as claimed in [any of claims 42 to 46] claim 42, wherein the step of cleaning the surface of the coat layer and the step of renewing the coat layer are performed in a printing machine.

50. (Amended) A method for preparing and renewing a printing plate material, [wherein the step] the method comprising the steps, which are performed in a printing machine, of preparing a printing plate by irradiation of a surface of a coat layer of a printing plate material as claimed in claim 1[or 16] with light having a wavelength having an energy higher than a band gap energy of the titanium oxide photocatalyst,

[the step of]cleaning the surface of the coat layer, and

[the step of]renewing the coat layer[are performed in a printing machine].

51. (Amended) A method for preparing and renewing a printing plate material, [wherein the step] the method comprising the steps, which are performed in a printing machine, of preparing a printing plate by irradiation of a surface of a coat layer of a printing plate material as claimed in claim 24 with light having a wavelength having an energy higher than a band gap energy of titanium oxide photocatalyst to cause the above described surface of the coat layer in the irradiated region to emerge,

[the step of]cleaning the outermost surface including the surface of the coat layer which has emerged, and

[the step of]renewing the [coat] coating layer are performed in a printing machine.--

IN THE ABSTRACT

[An object is to provide a] A printing plate material which can be adapted to digitization of the printing process and recycled and a method for renewing it. As the printing plate material, there can be used one which includes a substrate on the surface of which a coat layer containing a titanium oxide photocatalyst and at least one member selected from salts or oxides of Fe^{2+} , Ni^{2+} , Mn^{2+} , Cr^{3+} , and Cu^{2+} is formed. In an initial state of the printing plate as prepared, it is adjusted to a state where the surface of the coat layer is hydrophobic.

This surface is irradiated with ultraviolet rays to convert a part of the surface to a hydrophilic surface. This conversion~is performed based on digital data corresponding to an image to be printed. In this case, the hydrophobic portion is used as a printing image portion and the hydrophilic portion is used as a non-printing image portion. After completion of the printing, the compound is applied again to change the surface of the coat layer into the initial state of the printing plate as prepared, in which the surface of the coat layer exhibits hydrophobicity again.--

In re Goodwin, Margrave, and Wagner, 198 USPQ 1 (CCPA 1978)

In re Goodwin, Margrave, and Wagner

(CCPA)
198 USPQ 1

Decided May 18, 1978

No. 77-596

U.S. Court of Customs and Patent Appeals

Headnotes

PATENTS

1. Patentability -- Invention -- In general (§ 51.501)

"Obvious to try" is not standard of 35 U.S.C. 103; disregard for unobviousness of results of "obvious to try" experiments disregards "invention as a whole" concept of Section 103.

2. Claims -- Indefinite -- In general (§ 20.551)

Claims -- Specification must support (§ 20.85)

Construction of specification and claims -- By specification and drawings -- In general (§ 22.251)

Specification -- Sufficiency of disclosure (§ 62.7)

Claims must be read in light of specification; applicants who have employed term (CF_x)_n that is found to be synonymous with carbon monofluoride, which Patent Office Board of Appeals described as "a known material of known properties," and is correctly used to identify any carbon monofluoride, including graphite fluoride, graphite being preferred, have properly complied with Section 112 requirement for precision and definiteness of claim language, even though they used claim terminology "known as (CF_x)_n" and have failed to provide evidence of knowledge in art.

Particular patents -- Mold Lubricant

Goodwin, Margrave, and Wagner, Mold Lubricant and Method, rejection of claims 1-4 and 14-23, reversed.

Case History and Disposition:

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Appeal from Patent and Trademark Office Board of Appeals.

Application for patent of George I. Goodwin, John L. Margrave, and Robert E. Wagner, Serial No. 341, 841, filed Mar. 16, 1973. From decision rejecting claims 1-4 and 14-23, applicants appeal. Reversed; Miller, Judge, concurring with opinion.

Attorneys:

Robert E. Wagner, Gerald T. Shekleton, and Wagner & Aubel, all of Chicago, Ill., for appellants.

Joseph F. Nakamura (Gerald H. Bjorge, of counsel) for Commissioner of Patents.

Judge:

Before Markey, Chief Judge, and Rich, Baldwin, Lane, and Miller, Associate Judges.

Opinion Text

Opinion By:

Rich, Judge.

This appeal is from the decision of the Patent and Trademark Office (PTO) Board of Appeals (board) affirming the rejection of claims 2-4, 14-20, 22 and 23 under 35 USC 103, and claims 21-23 under 35 USC 112, second paragraph, and, under the provision of 37 CFR 1.196(b), rejecting claims 1 and 21 under

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35 USC 103 in application serial No. 341, 841 for "Mold Lubricant and Method" filed March 16, 1973. We reverse.

The Invention

The invention is an improved mold lubricant and method involving application thereof to molds used in glass manufacture. Claims 1, 14, and 21 are illustrative of claims 1-4, 14-20,

and 21-23, respectively, the others being dependent therefrom.

1. In the method of manufacturing glass by shaping a molten gob of glass into a shape conforming to the shape of a cavity in a mold, said mold being formed of metal or the like, the improvement comprising coating said mold cavity which contacts said molten gob of glass during shaping with carbon monofluoride to provide relatively permanent lubrication.

14. The method of lubricating a mold for use in glass manufacturing, said mold being formed of metal or the like and having a cavity formed with recessed surfaces and being adapted for use in shaping a molten gob of glass into a desired shape-sustaining configuration, said method comprising cleaning said surfaces of said cavity of said mold, applying carbon monofluoride to said surfaces of said cavity, and heating said mold to a temperature of about 700°F.

21. In the manufacturing of glass wherein a gob of molten glass falls through a chute into a mold formed of metal or the like, said mold being adapted for shaping said gob into a glass object, the improvement which comprises coating surfaces on said mold coming into contact with said molten glass with a stoichiometric composition known as $(CF_x)_n$ to provide permanent lubrication.

The References

The references relied on are:

Table set at this point is not available. See table in hard copy or call BNA PLUS at 1-800-452-7773 or 202-452-4323.

The §103 Rejection

All claims rejected by the board under 35 USC 103 were found unpatentable over the combined disclosures of Barkhau and Margrave. Barkhau teaches using various lead compounds in a method of lubricating metal glassware molds that contact molten glass having a temperature of approximately 871°-927°C. Margrave discloses carbon monofluorides useful as solid lubricants and stable in oxidizing atmospheres at temperatures up to 800°C. With little elaboration, the board concluded that it would have been obvious to employ Margrave's carbon monofluorides as lubricants in Barkhau's glass manufacturing processes. On reconsideration, the board reiterated Margrave's teaching that his stable carbon monofluorides permitted use to the fullest extent of their stability in oxidizing atmospheres at temperatures as high as 800°C. The board considered that "such disclosures would have suggested the use of those compounds as lubricants in glass manufacturing processes."

The §112 Rejection

The examiner rejected claims 21-23, which set forth the lubricant $(CF_x)_n$, as indefinite for not properly limiting the unknown "x." The examiner noted that in their specification appellants have stated the fluorine to carbon ratio of 0.99-1.12/1.00 as that of only the preferred form of the invention, and have nowhere set an upper limit of x. Thus, he contended

that because the specification does not define an upper limit of x, there is no basis for interpreting (CF_x)_n in the light of the specification to be limited as appellants argue. The board sustained the rejection on the same grounds.

Opinion

Regarding the §103 rejection, we find no evidence to support the PTO position that because Margrave discloses superstoichiometric carbon monofluorides to be stable and effective lubricants at temperatures up to 800°C., those compounds (and other carbon monofluorides taught to be less stable) would be reasonably expected to be successful mold lubricants in the glass-forming art requiring temperatures of 871°-927°C., as taught by Barkhau, or 982°-1204°C., as disclosed in appellants' specification. The explicit teaching in Barkhau is that "the lubricant which is employed for coating glass molds and glass making equipment must be stable up to at least 1600°F. [871°C.]." The PTO has shown no evidence to overcome appellants' argument that "on a fair reading of

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MARGRAVE et al. there is no suggestion of the use of carbon monofluoride at a temperature in excess of 800°C. and particularly not those temperatures of use taught in the disclosure of the subject application, i.e., 982°-1204°C."

The solicitor argues that claims 1-4 require only "relatively permanent lubrication," which the skilled artisan would have every reason to believe carbon monofluoride would provide. Alleged support is drawn from appellants' specification indicating that "should any decomposition occur," it will result in a colorless, odorless, non-toxic gas. The solicitor contends that, accordingly, decomposition is to be expected, which, consistent with the claim language, supra, we are to believe is sufficient to render obvious the use in glass molding of Margrave's carbon monofluorides. It is clear to us that appellants, in discussing possible decomposition, have merely anticipated the *un* expected in the use of their lubricants that might, on occasion, occur to some de minimis extent. Moreover, the words "relatively permanent" appear unrelated to sporadic decomposition, but rather refer to normal wear under operating conditions. Interpreting "relatively permanent" in the light of the specification, we conclude that use of that term fails to substantiate the solicitor's case for obviousness.

The solicitor further contends that claims 14-20 are unaffected by the temperature limitation in Margrave's patent because those claims are directed to a method of lubricating a mold with a "conventional lubricant in conventional manner." Appellants' reply is well taken. It is the use of carbon monofluoride in glass mold lubricating that is unconventional.

The situation in *In re Neugebauer*, 51 CCPA 1138, 330 F.2d 353, 141 USPQ 205 (1964), cited by the solicitor, is distinguishable. In considering the limitation "electrically conductive support layer," this court concluded that the applicants had employed chiefly paper sheets of no special type -- and as used by the prior art -- and had pretreated them in a conventional manner. In their brief and disclosure, applicants had indicated no peculiarity in the paper to distinguish it from that used in the prior art. That is not the case here. Appellants have clearly indicated the unconventionality of using carbon monofluorides in the glass-mold lubricating technology. While the prior art teaches use of the compounds as lubricants with

characteristics that are valuable to appellants, it also teaches their use below temperatures necessarily used in appellants' technology.

[1]At best, the PTO has shown evidence that it would have been obvious to the skilled artisan to try Margrave's carbon monofluorides. However, this court has consistently refused to recognize "obvious to try" rejections. "As we have said many times, *obvious to try* is not the standard of 35 USC 103. In re Tomlinson, 53 CCPA 1421, 363 F.2d 928, 150 USPQ 623 (1966). Disregard for the unobviousness of the results of 'obvious to try' experiments disregards the 'invention as a whole' concept of §103 * * *. " In re Antonie, 559 F.2d 618, 620, 195 USPQ 6, 8 (CCPA 1977) (emphasis in original).

Accordingly, we reverse the decision of the board rejecting claims 1-4, 14-20, and 21-23 under 35 USC 103.

[2]Respecting the rejection of claims 21-23 as indefinite under §112, second paragraph, we disagree with the PTO. Despite the undefined subscripts in the term $(CF_x)_n$, when we read these claims in light of the specification, as we must, we are constrained to accept appellants' contention that the aforementioned term, as employed in their application, is synonymous with carbon monofluoride, which the board described as "a known material of known properties." Notwithstanding appellants have used the claim terminology "known as $(CF_x)_n$ " and have nonetheless utterly failed to provide evidence of knowledge in the art, we find enough, though by no means overwhelming, support in the specification to conclude that one skilled in the art would be apprised of a reasonable degree of particularity and distinctness.

Specifically, in their abstract appellants refer to the lubricant of the invention as "carbon monofluoride $(CF_x)_n$," and subsequently, in the description, identify the lubricant as "graphite fluoride $(CF_x)_n$." Moreover, in his Answer before the board, the examiner stated that "carbon monofluoride is a graphite fluoride, and it has been called graphite fluoride by the art - $(CF)_h$ [sic, n]."

Though the questioned term is used synonymously with both carbon monofluoride and graphite fluoride, resort to the incorporated Margrave patent *

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(Margrave being a co-inventor on the application before us) resolves any ambiguity. There, the term "carbon" is used to describe the general class of materials -- of which graphite is preferred -- that can be reacted with fluorine to form carbon monofluorides. Graphite is merely the carbon form most prominently exhibiting layers of carbon atoms in hexagonal arrangement; hence, the term carbon monofluoride is generic and encompasses graphite fluoride. Thus, if the chemical formula $(CF_x)_n$ is synonymous with carbon monofluorides, as we find it to be, it is correctly used to identify any carbon monofluoride, including graphite fluoride.

We conclude that appellants have properly complied with the §112 requirement for precision and definiteness of claim language, and reverse the decision of the board rejecting

claims 21-23 under the second paragraph of §112.

In summary, we reverse the decision of the board as to the §103 rejections of claims 1-4, 14-20, and 21-23, and reverse the decision of the board as to the §112 rejection of claims 21-23.

Reversed.

Footnotes

Footnote * U.S. Patent No. 3,674,432, issued July 4, 1972, on application serial No. 867,678, filed Oct. 20, 1969.

Concurring Opinion Text

Concur By:

Miller, Judge, concurring.

I agree with the majority's analysis and treatment of the section 103 rejection; however, I am in some disagreement with its analysis of the indefiniteness rejection under section 112, second paragraph.

The PTO has conceded that the term "carbon monofluoride," which is used in claims 1-4 and 14-20, is definite. The majority properly finds that "the term $(CF_x)_n$ *** is synonymous with carbon monofluoride." However, it then unnecessarily and confusingly injects a discussion of the term "graphite fluoride." Appellants, in their specification, have used the terms "carbon monofluoride" and " $(CF_x)_n$ " interchangeably to designate the same chemical compound.¹ Accordingly, no further discussion of the definiteness of the term " $(CF_x)_n$ " is needed.

The majority analyzes the specification and the Margrave reference and incorrectly concludes that "the term carbon monofluoride is generic and encompasses graphite fluoride." Only once does the specification use the term "graphite fluoride," and then in a manner indicating that graphite fluoride is generic to carbon monofluoride:

The lubricant of the present invention *may be described* as graphite fluoride $(CF_x)_n$. *In the preferred form*, it is a stable carbon monofluoride having a maximum super stoichiometric fluorine to carbon ratio prepared by the method *** [of the Margrave reference]. [Emphasis added.]

Such characterization by the specification is consistent with the examiner's statement that "carbon monofluoride is a graphite fluoride." The Margrave reference never uses the term "graphite fluoride" and merely states that carbon monofluoride can be made from "graphite, or those forms of carbon having some graphitic structural characteristics."

Footnotes

Footnote 1. E.g., "In the preferred form [of $(CF_x)_n$], the fluorine to carbon ratio is greater than 0.99/1.00 or 1.12/1.00"; "Better results were obtained with carbon monofluoride having a ratio of above 0.99/1.00 and preferably in the range of about 1.12/1.00"; "The lubricant is carbon monofluoride $(CF_x)_n$ wherein 'x' is about 0.7 or, preferably, above 1.00."

- End of Case -